

Chapter 4: Factors Associated with Cessation Strategies and Quit Success

This chapter examines the experiences of Massachusetts smokers who attempt to quit, with particular attention to whether they received tobacco treatment services or other assistance, and what factors are associated with their likelihood of success in quitting. Descriptive statistics and logistic regression analyses are based principally on the Massachusetts Adult Tobacco Survey. About half of attempting quitters reported receiving some form of assistance, with nicotine replacement therapy (NRT) being the most common. A small proportion (about 7 percent) reported receiving NRT in combination with counseling, the preferred approach among MTCP-funded programs. The group receiving NRT with counseling had a substantially greater short-term success rate than those reporting other approaches, although the success rate reflects self-selection as well as the efficacy of the quit approach.

Introduction

A central goal of the MTCP is to reduce smoking prevalence by encouraging and helping current smokers quit. To this end, MTCP funded community-based Tobacco Treatment Services (TTS) programs that offer individual or group counseling, often in combination with nicotine replacement therapy. This direct service was complemented by the Smoker's Quitline, which provided telephone counseling as well as referrals to TTS programs, and by referrals and guidance information available on-line through the website TryToStop.org. In addition, media campaigns and community-level public education initiatives worked to motivate smokers to quit, to guide them to in-person, telephone, or on-line services, and to provide self-help information on quitting.

A great deal of research, much of it summarized in the 2000 Surgeon General's Report,¹ has examined the efficacy of treatment in bringing about sustained smoking cessation. Strong evidence indicates that both counseling and nicotine replacement therapy are effective, and that combining them results in greater success than either approach alone.² Advice from health professionals, even brief advice, has some effect, and self-help materials are about equivalent to brief advice in their effectiveness.³

Much of the research on tobacco treatment has been done in controlled trials, with subjects randomly assigned to alternative treatments. This contrasts with a "real world" setting, in which smokers who are interested in quitting make choices and take actions that determine what, if any, assistance they

receive in quitting. For example, Zhu and colleagues found that more addicted smokers tend to be the ones seeking assistance, and that females, older persons, and Non-Hispanic Whites are more likely to use assistance.⁴

This research suggests that the patterns of assistance usage and quit success will depend on both the characteristics of the smoking population and the availability and efficacy of various forms of assistance. The question addressed here is how these factors have played out in Massachusetts. We first examine the extent to which demographic and social characteristics of individuals are predictive of their short-term success in quitting smoking when they attempt to do so. We review the types of assistance they use in their quit attempt, and the extent to which the choice of quit approach varies by demographic and social characteristics. Finally, we compare the short-term success rates associated with the various quitting approaches, adjusting for differences in (measured) demographic characteristics.

Data Sources

The analyses presented here are based upon data from the Massachusetts Tobacco Survey (MTS) and the Massachusetts Adult Tobacco Survey (MATS). These surveys are described in detail elsewhere.^{5,6} Briefly, the MTS is a 1993 telephone survey administered by the Center for Survey Research at the University of Massachusetts, Boston, to establish baseline levels of smoking behaviors and attitudes among Massachusetts residents. Beginning in 1995, the MATS is a monthly continuation of the adult portion of the MTS. In both the MTS and the MATS surveys, a household respondent answers a brief screening survey, and then an eligible member of the household is randomly selected to answer a more extensive questionnaire.

Our analysis focuses on persons who attempted to quit smoking within the year prior to the interview, where “attempt to quit” is defined as quitting for at least one day in the past year. “Quit success” is defined by a respondent reporting not smoking at the time of the interview (answering “not at all” to the question, “Do you smoke cigarettes every day, some days, or not at all?”).

This analysis seeks to describe quit success with respect to demographic characteristics, home and social environment, and methods of quitting. Demographic characteristics include gender, and categorical variables for age (18-24, 25-44, 45-64, and 65 or more), race (Non-Hispanic White, Non-Hispanic Black, Hispanic, and the balance of other races), and education (less than high school, high school graduate/some college, and college graduate). Home and social environment variables include

the presence of children under 12 years of age in the household, and categorical variables for the adult composition of the household (no other adults, other adult(s) but no smokers, or at least one other adult who smokes) and the number of friends who smoke (two or fewer vs. three or more).

In fiscal year 1999, MATS began to ask attempting quitters a series of questions about the types of information, assistance, or treatment they received during their most recent quit attempt. To examine the effect of these aids on quit success, we use a series of binary variables indicating whether the respondent received counseling only, nicotine replacement therapy only, a combination of counseling and nicotine replacement therapy, advice only, or no treatment at all.

Analytic Methodology

We use a logistic model to determine factors that influence quit success. Our basic model is:⁷

$$\Pr(Y_i = \text{Quit Success} \mid x_i) = \frac{1}{1 + e^{-(x_i \mathbf{b} + \mathbf{e}_i)}}, \text{ or}$$

$$\text{Logit}(Y_i) = x_i \mathbf{b} + \mathbf{e}_i$$

Where:

x_i = Vector of covariates

\mathbf{b}_i = Vector of coefficients that relate the influence of the x_i on quit success

\mathbf{e}_i = Independent, identically distributed error term.

Although this is the basic model, there are some nuances in the data that necessitate some modifications to this model.

As outlined in Beiner and Roman (1999), the MTS/MATS is a stratified random digit dial sample, where the strata represent five major cities in Massachusetts and the balance of the State. Prior to 1998, within each stratum the MTS/MATS is sampled by a modified Mitofsky-Waksberg method. Each area code and exchange has two random digits appended to create clusters. They select a random sample of these clusters, and append 2 more random digits for complete telephone numbers. Since nonresidential numbers are not replaced within the cluster but rather from some other random cluster, different telephone numbers within a stratum will have different probabilities of selection into the MTS/MATS sample. Conceptually, this amounts to decomposing the error \mathbf{e}_i above term into two parts:

$$\mathbf{e}_{ci} = \mathbf{d}_c + u_i$$

\mathbf{d}_c is a random error term, sometimes called a random effect. This is particular to each cluster c , or block of 100 telephone numbers. u_i is an iid error term for each person in the sample.

After 1998, MATS employed the GENESYS system for sample selection⁶. It is a list-based sampling methodology that identifies all blocks of 100 telephone numbers containing at least one residential number. Its advantage is since every block of 100 telephone numbers is part of the sample frame, there is no clustering effect (i.e. any \mathbf{d}_c). The individual error term in this case is $\mathbf{e}_{ci} = u_i$. The Logistic procedure in SUDAAN accounts for both types of sampling, and computes correct point estimates and standard errors when using population weights generated from the sampling methodology.⁸

Ideally, rather than the logistic model presented, one might prefer to estimate a survival model, where a vector of covariates describes the time until a smoker starts smoking after their last quit attempt. Indeed, we considered this approach, but the structure of the data make it infeasible. Most importantly, the exact date of quitting, and therefore the duration of the non-smoking spell, is unknown. For those smokers who attempted to quit within the past year but failed, one only knows about a quit attempt *sometime* within the past year, with a coarse measure of the duration of the abstinence spell (1, 2-6, 7-14, or 15-30 days, or 1-3 or 3+ months). For those smokers who had quit within the past year and were still not smoking at the time of the interview, the measure is even coarser (0-1, 1-3, 3-6, and 6-12 months).

This data structure limits the analysis to using a logistic model of quit success in the year prior to the interview. Fortunately, this is still a model that, on average, reflects reality. If quit attempts are distributed uniformly over the year prior to the interview, on average the person will have their last quit attempt 6 months prior to the interview. The data's gross measures of time since quitting for those who were not smoking at the time of the interview suggest that is the case. On average, then, the logistic regression should reflect quit success over a six-month time period.

In the model estimation process, the criterion for including a variable was the change in goodness of fit for the model. Although many of the parameter estimates in regressions estimated are not statistically significant at the 95 percent level, likelihood-ratio tests of groups of variables such as the age and race categories reveal that the model fit is better when including these variables. In addition, parameter estimates and p-values are robust to different specifications of the covariates.

A number of observations were excluded from our analysis due to missing one or more necessary covariates. Exhibit 4.1 shows the number of missing values for each fiscal year of data. To examine the effect of excluding these observations, we imputed values using a random draw from the distribution of non-missing cases. After imputing missing values, all analyses were re-estimated. Parameter estimates and p-values are robust to including observations with missing values, suggesting that they are missing at random. Therefore, we present analyses using only observation with no missing values of the analysis variable s.

Exhibit 4.1

Number and Percent of Sample with at least One Missing Analysis Variable, by Fiscal Year

Fiscal Year	Number in Sample	Number with Missing Values	Percent of Sample
Full Data			
1993	846	70	8.3
1995	111	15	13.5
1996	350	25	7.1
1997	356	17	4.8
1998	349	8	2.3
1999	332	20	6.0
2000	364	20	5.5
2001	180	14	7.8
Quit Treatment Analysis			
1999	332	20	6.0
2000	364	21	5.8
2001	180	14	7.8

Results

Demographic and Social+ Factors Related to Successful Quitting

On average, about 43 percent of all Massachusetts smokers tried to quit each year from 1993-2001. Over the period, roughly 20 percent of the smokers who attempted to quit in the 12 months prior to their interview were not smoking at the time of their interview. It should be noted that persons not smoking at the time of the interview could relapse later, so long-term or permanent success rates would be lower.

Results from the logistic regression for fiscal years 1993-2001 are presented in Exhibit 4.2. The univariate proportion is the simple weighted percentage from the survey. The adjusted proportion is the predicted percentage from the model, holding all other covariates constant at their weighted population averages. The parameter estimates and p-values are taken from the logistic model, as is the odds ratio, which is the likelihood of quitting for the specified group as compared to that group's reference.⁹

Exhibit 4.2
Factors Related to Quitting Success, Fiscal Years 1993 - 2001

		Percent Quitting Successfully		Parameter Estimate	p-value	Odds Ratio
		Univariate Proportion	Adjusted Proportion			
Intercept		20.3%	19.0%	-1.35	0.02	0.26
Fiscal Year						
	1993	18.0%	16.6%	Reference		
	1995	16.1%	17.3%	0.05	0.94	1.05
	1996	17.3%	17.2%	0.04	0.91	1.04
	1997	24.8%	21.6%	0.32	0.34	1.38
	1998	26.6%	23.6%	0.44	0.21	1.55
	1999	24.1%	22.6%	0.38	0.28	1.46
	2000	25.0%	25.1%	0.52	0.09	1.69
	2001	12.5%	12.8%	-0.31	0.51	0.73
Gender						
	Male	18.3%	17.9%	-0.14	0.55	0.87
	Female	22.2%	20.2%	Reference		
Age						
	18-24	14.2%	15.8%	Reference		
	25-44	20.6%	19.8%	0.27	0.44	1.31
	45-64	21.5%	19.6%	0.26	0.51	1.30
	65+	26.3%	18.6%	0.19	0.73	1.21
Race						
	Non-Hispanic White	21.5%	19.4%	Reference		
	Non-Hispanic Black	20.8%	16.7%	-0.18	0.71	0.83
	Hispanic	12.8%	11.9%	-0.58	0.26	0.56
	Other	19.3%	24.6%	0.31	0.75	1.36
Education						
	Less than HS	15.1%	15.4%	Reference		
	HS Grad/Some post HS	20.2%	19.6%	0.29	0.50	1.34
	College Grad+	24.5%	19.7%	0.30	0.50	1.35
Friends who Smoke						
	2 or Fewer	30.1%	28.2%	Reference		
	3 or More	14.1%	14.5%	-0.84	<0.01	0.43
Other Adults in Household						
	None	26.3%	23.6%	0.13	0.65	1.13
	Adult(s) but no Smoker	23.4%	21.4%	Reference		
	At Least One Smoker	14.4%	15.2%	-0.42	0.11	0.66

The smoker's social and home environments are clearly related to the likelihood of successfully quitting. Attempting quitters with three or more friends who smoke are less than half as likely to succeed quitting than those with fewer smoking friends. Similarly, the point estimates indicate that an attempting quitter living with another smoking adult is roughly one-third less likely to quit

successfully than if he or she were living with a non-smoking adult, but this relationship is not statistically significant ($p = 0.11$).

Demographic groups show no significant differences in quitting success. Although females, Non-Hispanic Whites, high school and college graduates, and older persons are estimated to have higher likelihoods of quit success, none of these estimates approach statistical significance at even the 10 percent level.

Aids to Quitting

Smokers who tried to quit in fiscal years 1999-2001 reported a variety of approaches to their most recent quit attempt. As shown in Exhibit 4.3, 54 percent said that they did not use any of the five forms of assistance covered in the MATS interview. About 30 percent reported using some form of nicotine replacement therapy (NRT), usually a transdermal nicotine patch. Nearly as many (27 percent) received some cessation-related advice from a health professional. Less common were the use of informational materials (16 percent), enrollment in a quit-smoking program (9 percent), or calling the Smoker's Quitline (4 percent). Many smokers said they used multiple types of assistance, including a few people who reported all five types of assistance in their most recent quit attempt.

Exhibit 4.3

Percentages of Attempting Quitters Using Specified Types of Quit Assistance

	Unweighted Sample	Proportion in population (weighted)
No Assistance Reported	473	53.9%
Form of Assistance		
Used Nicotine Replacement Therapy: Total	219	30.3%
Gum	32	5.0%
Patch	149	21.0%
Spray	1	0.0%
Other	37	4.2%
Joined Quit Smoking Program	47	9.2%
Got Advice from Doctor, Counselor, or Other Professional	230	26.6%
Used Books, Pamphlets, or Video Tapes	118	15.6%
Called Smoker's Telephone Quit Line	32	4.3%
Combinations^a		
NRT and Program	29	6.6%
NRT but not Program	208	23.7%
Program but not NRT	26	2.6%
Not NRT or Program, but Some Assistance	140	13.3%
No Assistance Reported	473	53.9%

a Those that include NRT and/or Program may also report professional advice, informational materials, and/or Quitline.

To further examine the quit assistance strategies of particular interest to the MTCP, we grouped attempting quitters into the five categories shown in the bottom panel of Exhibit 4.3. Tobacco treatment that includes formal counseling as well as NRT or other pharmaceutical therapy is the most intensive treatment suggested by MTCP-funded programs, and we maintained it as a separate category despite the relatively small number of respondents (6.6 percent, or 29 responses). Use of the Smoker's Quitline was not analyzed separately because it was usually reported in conjunction with NRT, participation in a quit-smoking program, or both treatments, which are assumed to be more intensive interventions.

The proportions of selected demographic groups using each of the five quit approaches is shown in Exhibit 4.4. Within each demographic dimension, subgroup differences were tested for statistical significance in bivariate tests (results not shown on table because of the large number of tests). Significant and marginally significant relationships ($p < 0.10$) found in these tests were as follows:

- Men who attempt to quit are more likely than women to use quit-smoking program in conjunction with NRT ($p < 0.05$). Men are less likely to use assistance other than NRT and quit-smoking programs ($p < 0.01$).
- Persons aged 18-24 were more likely than older groups to say that they used no assistance ($p < 0.01$).
- Non-Hispanic Blacks were less likely than Non-Hispanic Whites to use any assistance ($p < 0.05$). Although the sample of Hispanics is small, the data suggest low utilization of NRT alone or with quit-smoking programs relative to Non-Hispanic Whites ($p < 0.01$).
- People with a high school diploma or more were more likely than those with less education to report the combination of a quit-smoking program and NRT ($p < 0.01$). People with less than a high school education were more likely to say they used assistance that did not include either NRT or quit-smoking programs ($p < 0.01$). People who graduated high school but not college were more likely to use any assistance than the other education groups, although this association is only marginally significant ($p = 0.06$).
- Attempting quitters who have 3 or more friends who smoke were more likely to use the NRT and quit-smoking program combination (marginally significant at $p = 0.09$).
- People who did not live with other adults were less likely to only use NRT ($p < 0.05$).

- The presence of children is not significantly associated with particular quitting approaches.

Exhibit 4.4

Types of Assistance Used by Attempting Quitters, by Population Subgroups: Percent Reporting Each Type of Assistance

		NRT and Program	NRT but Not Program	Program but not NRT	Not NRT or Program, but Some Assistance	No Assistance Reported
Total		6.6%	23.7%	2.6%	13.3%	53.9%
Gender						
	Male	11.1%	24.2%	0.6%	5.6%	58.5%
	Female	4.4%	24.3%	4.0%	19.9%	47.4%
Age						
	18-24	0.3%	1.4%	0.9%	16.9%	80.4%*
	25-44	7.1%	30.7%	3.7%	9.2%	49.3%
	45-64	14.0%	28.0%	1.1%	12.0%	44.9%
	65+	0.6%	22.0%	4.0%	38.8%	34.6%
Race						
	Non-Hispanic White	5.4%	27.0%	2.7%	12.1%	52.9%
	Non-Hispanic Black	26.7%	9.5%	1.0%	31.6%	31.2% [†]
	Hispanic	0.8%	8.2%	2.9%	25.3%	62.9%
	Other	32.3%	6.4%	0.5%	2.8%	58.1%
Education						
	Less than HS	0.6%	6.8%	0.3%	26.6%	65.8%
	HS Grad/Some post HS	7.5%	29.0%	3.5%	12.6%	47.5%
	College Grad+	10.4%	17.3%	0.3%	10.4%	61.6%
Kids <12 in Household						
	Yes	10.5%	19.2%	6.1%	14.5%	49.7%
	No	6.3%	25.9%	1.3%	13.4%	53.1%
Friends who Smoke						
	2 or Fewer	2.7%	20.6%	1.0%	18.9%	56.8%
	3 or More	9.6%	26.0%	3.3%	11.1%	50.0%
Other Adults in Household						
	None	3.2%	14.4%	3.1%	19.4%	59.9%
	Adult(s) but no Smoker	4.7%	26.3%	2.0%	14.8%	52.3%
	At Least One Smoker	12.6%	25.0%	3.1%	9.9%	49.3%

Note: Significance tests only reported for no assistance vs. any, by each population subgroup. Other statistically significant associations are reported in the text.

Statistical Significance: [†] = < 0.10 * = < 0.05

Quit Approach and Success Rates

Ideally, we would like to know to what extent the various quit approaches contributed to people's success in quitting. Selection bias makes this impossible. The analysis above shows that a number of demographic and social factors are related to the choice of quit approaches, and it is quite likely that additional factors not measured in the data—such as the individual's addiction level or motivation to quit—are correlated with both the choice of quit approaches and the likelihood of success. Without controlling for these unmeasured factors, we cannot know whether an observed association between quit method and success rate reflects the effectiveness of the method or the effect of some omitted variable.

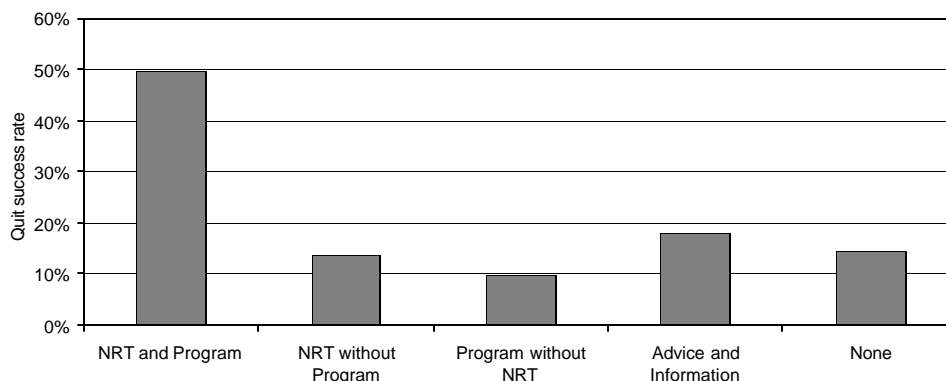
Examining the association between quit method and success rate may nonetheless be informative, particularly if the analysis controls for those demographic and social factors that seem related either to the choice of quit approaches or the likelihood of quit success. We therefore estimated a logistic regression model of quit success including the demographic, social, and quit success variables seen in previous analyses, and used this model to derive adjusted quit success rates for population subgroups. Exhibit 4.5 presents unadjusted and adjusted quit success rates by group.

Smokers who attempted to quit using a combination of NRT and a quit-smoking program had an adjusted success rate of 50 percent, far above the percentage for any other quit approach ($p = 0.02$). Success rates with other forms of quit assistance were not significantly different from the rate for quitters reporting that they received no assistance.

Other parameter estimates in the model were similar to those seen earlier for the full 1993-2001 period (Exhibit 4.2). Quit success was less likely for persons having three or more friends who smoke ($p < 0.01$) or living with another adult smoker ($p = 0.08$). Again, demographic characteristics were not closely associated with quit success (the exception is the small Other race category, which has a significantly higher success rate in this sample).

Exhibit 4.5
Quitting Aids and other Factors Related to Quitting Success, 1999 – 2001

Percent Quitting Successfully					
	Univariate Proportion	Adjusted Proportion	Parameter Estimate	p-value	Odds Ratio
Intercept	19.8%	16.3%	-0.79	0.33	NA
Fiscal year					
1999	24.1%	20.4%	Reference		
2000	25.0%	24.2%	0.22	0.61	1.24
2001	12.5%	9.7%	-0.87	0.11	0.42
Quit Assistance					
None	19.1%	14.6%	Reference		
NRT and Program	24.1%	49.6%	1.76	0.02	5.79
NRT without Program	17.8%	13.6%	-0.08	0.86	0.93
Program without NRT	9.9%	9.7%	-0.47	0.65	0.63
Advice, Materials, Quitline	25.5%	18.1%	0.26	0.64	1.30
Gender					
Male	17.0%	14.9%	-0.19	0.62	0.83
Female	21.9%	17.5%	Reference		
Age					
18-24	13.2%	13.8%	Reference		
25-34	22.3%	21.5%	0.54	0.31	1.71
35-64	14.2%	9.8%	-0.39	0.51	0.68
65+	39.4%	23.2%	0.63	0.40	1.88
Race					
Non-Hispanic White	19.1%	15.3%	Reference		
Non-Hispanic Black	29.1%	16.7%	0.11	0.87	1.11
Hispanic	17.7%	17.2%	0.14	0.83	1.15
Other	39.1%	55.5%	1.93	0.03	6.91
Education					
Less than HS	15.2%	13.9%	Reference		
HS Grad/Some post HS	18.7%	16.6%	0.21	0.71	1.24
College Grad+	27.7%	16.4%	0.19	0.78	1.21
Kids <12 in Household					
Yes	16.3%	12.6%	-0.41	0.36	0.67
No	21.0%	17.7%	Reference		
Friends who Smoke					
2 or Fewer	33.5%	29.5%	Reference		
3 or More	13.1%	11.8%	-1.13	<0.01	0.32
Other Adults in Household					
None	33.5%	27.9%	0.47	0.36	1.61
Adult(s) but no Smoker	21.7%	19.4%	Reference		
At Least One Smoker	11.8%	10.0%	-0.77	0.08	0.46



Discussion

Patterns of smoking cessation in Massachusetts are roughly consistent with those for the United States as a whole. In the 1993-2001 surveys, about 9 percent of respondents who were smoking a year previously were not smoking at the time of the survey although 43 percent had quit for at least one day during the year. Nationwide, the 2000 National Health Interview Survey found that 5 percent of those who smoked a year previously had not smoked for at least 3 months at the time of the interview, out of 41 percent who had quit for at least a day.¹⁰

No demographic characteristics were significantly related to successful quitting among those who tried to quit in Massachusetts, corresponding to the pattern seen in California in 1999.¹¹ Social factors may be more important, however. Having three or more friends who smoke significantly reduced Massachusetts smokers' chances of quit success. Having a smoker as a member of the household may reduce the chances even more, although this variable was only marginally significant. Other research has also found the smoker's social environment to be important.¹² The smoker's level of addiction has also been found important in prior research,¹³ but was not considered here because of data limitations.

Among Massachusetts smokers attempting to quit, 46 percent reported using one or more kinds of quit aid, including nicotine replacement therapy (30 percent), counseling programs (9 percent), advice from a doctor or professional (27 percent), informational materials (16 percent), and the Smoker's Quitline (4 percent). The rate of use of assistance in general, and NRT and counseling programs in particular, appears to be greater in Massachusetts than in California, although differences between the Massachusetts and California survey questions make exact comparisons impossible.¹¹

The choice of quit approaches in Massachusetts varied across subgroups defined by demographic and social variables. Smokers under age 25 were most likely to report using no assistance, while Non-Hispanic Black smokers were the most likely to report some form of assistance and especially used NRT combined with counseling. More highly educated smokers tended to use NRT with counseling, while those with less than a high school diploma tended to use information and advice only. Most of these patterns are consistent with those reported for California,^{4,11} but there are also differences, notably the high rate of assistance reported by Non-Hispanic Blacks in Massachusetts. Such differences may arise from differences in the patterns of availability of various kinds of assistance (e.g., the location of counseling programs relative to the location of subgroup concentrations), differences in awareness of the resources, as well as from regional differences in preferences regarding quit approaches.

Perhaps the most striking result of the analysis is the high quit success rate in Massachusetts for people who report using both NRT and counseling, the preferred approach in MTCP treatment plans. This success rate (nearly 50 percent after adjusting for other factors in the model) was far higher than the rate for any other form of assistance including no assistance at all (adjusted success rates from about 10 to 18 percent). Two caveats apply to this finding: the success rates result from self-selection as well as the efficacy of alternative quit approaches, and the sample size of people using NRT with counseling is quite small. Nonetheless, the analysis points out the importance of learning more about quit approaches as they are actually selected and used in Massachusetts in order to determine how best to use scarce program resources.

This study has several important limitations, particularly with respect to the findings regarding quit assistance approaches. First, only short-term quit success was measured, and long-term abstinence patterns could be different. Second, the analysis did not include measures of the level of addiction, which have been found important in other research. Another limitation concerns the self-reported measure of assistance received, which is subject to measurement error; in particular, it seems likely that successful quitters may under-report the assistance they received, and reporting accuracy may vary by type of assistance. Finally, the numbers of respondents who reported they received specific kinds of assistance are small, and while significance tests take this into account, it would be reassuring to see the analysis replicated with larger samples.

Endnotes

- ¹ U.S. Department of Health and Human Services. *Reducing Tobacco Use: A Report of the Surgeon General*. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health, 2000.
- ² Fiore MC, Bailey WC, Cohen SJ, Dorfman SF, Goldstein MG, Gritz ER, Heyman RB, Jaén CR, Kottke TE, Lando HA, Mecklenburg RE, Mullen PD, Nett LM, Robinson L, Stitzer ML, Tommasello AC, Villejo L and Wewers ME. Treating Tobacco Use and Dependence. Clinical Practice Guideline. Rockville, MD: US Department of Health and Human Services, Public Health Service, 2000.
- ³ Lancaster T, Stead L, Silagy C, Sowden A. Effectiveness of interventions to help people stop smoking: findings from the Cochrane Library. *BMJ*. 2000;321(7257):355-8.
- ⁴ Zhu S-H, Melcer T, Sun J, Rosbrook B, Pierce JP. Smoking cessation with and without assistance: a population-based analysis. *American Journal of Preventive Medicine* 2000;18(4):305–11.
- ⁵ Biener L and Roman AM. *1998 Massachusetts Adult Tobacco Survey: Technical Report and Tables*. Boston, MA.: Center for Survey Research, University of Massachusetts, 1999.
- ⁶ Biener L, Roman AM, and Nyman AL. *1999 Massachusetts Adult Tobacco Survey: Technical Report and Tables*. Boston, MA: Center for Survey Research, University of Massachusetts, 2000.
- ⁷ Wooldridge, JM. *Econometric Analysis of Cross Section and Panel Data*. Cambridge: The MIT Press. 2002.
- ⁸ Research Triangle Institute. *SUDAAN User's Manual, Release 8.0*. Research Triangle Park, NC: Research Triangle Institute. 2001.
- ⁹ The estimated success rate for 2001 is considerably lower than that in prior years (although the difference is not statistically significant), raising the question of data reliability in that period. (Preliminary data from a related survey conducted in the second half of fiscal year 2001 indicate a success rate of about 29 percent, which would be consistent with the earlier trend.) Because of the seeming inconsistency, we checked all presented results by running the analyses with 2001 excluded. Parameter estimates and variances appear to be robust to the inclusion or exclusion of 2001 MATS data, so we include these data.
- ¹⁰ Centers for Disease Control and Prevention. Cigarette Smoking Among Adults, 2000. *MMWR* 2002; 51(29):642-645.
- ¹¹ Gilpin EA, Emery SL, Farkas AJ, Distefan JM, White MM, Pierce JP. *The California Tobacco Control Program: A Decade of Progress, Results from the California Tobacco Surveys, 1990-1998*. La Jolla, CA. University of California, San Diego. 2001.
- ¹² Rice VH, Templin T, Fox DH, Jarosz , Mullin M, Seiggreen M, Lepczyk M. Social context variables as predictors of smoking cessation. *Tobacco Control*. 1996; 5:280-285.
- ¹³ Farkas AJ, Pierce JP, Zhu SH, Rosbrook B, Gilpin EA, Berry C, Kaplan RM. Addiction versus stages of change models in predicting smoking cessation. *Addiction*. 1996;91:1271-76.